Electronic Journal of Plant Breeding, 9 (2) : 786 - 789 (June 2018) DOI: 10.5958/0975-928X.2018.00097.2
ISSN 0975-928X

Research Note

Variability for bruchid resistance in blackgram (*Vigna mungo* (L.) Hepper)

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(Received: 26 May 2018; Revised: 07 Jun 2018; Accepted: 26 Jun 2018)

Abstract
A laboratory experiment was conducted to estimate the variability parameters for traits related to bruchid infestation in various blackgram genotypes at National Pulses Research Center,Vamban. High phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) and heritability and genetic advance were noticed for the traits *viz.*, seed damage (%) and number of adults emerged at various days after the release of adults emergence (i.e adult emergence and developmental period). Prolonged developmental period with less number of adults may be due to antibiosis. The results indicated that sufficient level of variability for the traits related to bruchid infestation was available in the study material. Hence selection can be practiced to select bruchid resistant and high yielding genotypes in study material.

Keywords
Blackgram, buchid, variability, adult emergence, seed damage

Blackgram is one of the most important food legume crop cultivated in India. It constitutes the major source of dietary protein for majority of the Indians. The seeds stored by farmers, traders and millers for consumption, sowing and processing. *Callosobruchus maculatus* (F.) (Coleoptera: Bruchidae), a storage pest, causes severe infestation from the field itself. It can cause considerable damage in legume crops both in terms of quality and quantity. Perturbing the harmful effect from the insecticides, it is necessary to develop resistant genotypes for this storage pest. The traits such as reduced oviposition, less seed damage, low adult emergence and prolonged developmental period for the development of pulse bruchid were attributed to the tolerance in wild species of blackgram (Soundararajan *et al*.,2013). Hence, assessment of variability for these traits related to bruchid infestation are important in resistance breeding for bruchids. With this objective, a set of 61 genotypes of blackgram were studied for resistance to bruchids.

The experimental material consisted of 61 genotypes of blackgram which were obtained from Nuclear Agriculture and Biotechnology Division, Bhabha Atomic Research Center, Trombay and National Pulses Research center, TNAU, Vamban.

The stock culture of bruchids (*Callosobruchus maculatus* (F.)) was maintained using mungbean seeds at National Pulses Research Center, Vamban. The genotypes were subjected to screening for bruchid resistance under laboratory conditions following procedure adopted by Dongre *et al.*(1993) with modifications. Fifty seeds from each genotype were placed in petriplates with two replications. Five pairs of newly emerged adults were released in each petriplates. The adults were removed after five days to avoid secondary infestation. The observations on traits *viz.*, oviposition (number of eggs laid on 50 seeds), number of adults emerged, seed damage (%) and seed weight loss (%) on each genotype were recorded. The number of eggs laid on 50 seeds of each genotype were counted on the fifth day of adult release. Number of adults emerged on each genotype was recorded daily and expressed at various intervals *i.e.*,developmental period after adult release. The seed damage and seed weight loss were assessed after 105 days from adult release and expressed in percentage.The similar traits were recorded by various studies to assess the level of resistance to bruchids in blackgram and greengram. Del Rosario *et al.*(1997), Tomooka *et al.*(2000), Somta *et al.*(2007). Chen *et al.*(2007), Souframanien *et al.*(2010), Soundararajan *et al.*(2013), Swamy *et al.* (2016)

Variability parameters like phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h^2) and genetic advance as per cent of mean (GAM) were calculated as suggested by Johnson *et al.*(1955). PCV and GCV, heritability and genetic advance as per cent of mean were categorized as suggested by Sivasubramanian and Menon(1973), Robinson *et al*.(1949), Johnson *et al*.(1955), respectively.

The success of any breeding programme lies on the presence of substantial amount of variability in the

population for the traits studied. It is essential to subject a population for selection for the trait improvement. The present experiment was conducted to assess the presence of variability for various traits related to bruchid infestation among the various blackgram genotypes.

The variability parameters such as mean, range, phenotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV), heritability (h^2) and genetic advance as percentage of mean (GA) were presented in Table 1. Analysis of variance indicated the presence of significant amount of variability among genotypes for all traits studied.The number of eggs laid ranged from 42 to 236 eggs per 50 seeds, number of adults emerged ranged from 4 to 48 adults in 40 days, 9 to 50 adults in 50 days, 13 to 51 adults in 60 days, 18 to 53 adults in 70 days and 19 to 53 adults in 105 days . Seed damage (%) and seed weight loss (%) ranged from 40 to 89 % and from 28 to 44 %, respectively.

Among the traits observed, PCV was slightly greater than the GCV which indicated the less influence of environment on these traits. High PCV was recorded for number of adults emerged in 40 days (38.6%) , number of eggs on 50 seeds (30.5%) and number of adults emerged in 50 days (21.4%). Swamy *et al.*(2016) reported high variation for the trait seed weight loss (%) followed by number of adults emerged in 40 days. The trait seed weight loss followed by number of adults emerged in 105 days recorded moderate variation. Swamy *et al.*(2016) observed moderate variation for seed damage (%) followed by number of adults emerged in 80 days. High GCV was recorded for the trait number of adults emerged in 40 days (36.3%). Low GCV was recorded for seed weight loss (8.1%) whereas all the other traits recorded moderate GCV. This results indicated the presence of genetic variability for the traits related to bruchid infestation among the genotypes.

High heritability (%) was recorded for number of adults emerged in 40 days (88.7%), number of adults emerged in 50 days (74.9%), number of adults emerged in 60 days (67.9%), number of adults emerged in 70 days (65.7%), number of adults emerged in 105 days (60.0%) and seed damage % (70.4%). Hence, high heritability for seed damage (%) and number of adults emerged in various intervals depicted that these traits are highly heritable and improvement can be attempted for these traits.The traits such as number of eggs laid on 50 seeds and seed weight loss% had moderate heritability, which indicated that these traits also can be improved with limited progress due to the influence of environment.Genetic advance as per cent of mean was high for all the traits related to resistance except seed weight loss (%) which recorded moderate genetic advance as percent of mean. It indicated that selection will be effective for all these traits.

The traits *viz.,* number of adults emerged at different intervals (developmental period) and seed damage (%) had high GCV, PCV, heritability and GAM. The presence of unfavourable chemical constituents inside the cotyledons may be responsible for delaying the development of a growing grub as noticed by Somta *et al.*(2008). Hence the traits such as numbers of adults emerged at different intervals and seed damage (%) may be given more importance in the bruchid resistance breeding programme of blackgram.

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Table 1. Variability parameters for various bruchid resistant traits in blackgram genotype

Sl.no	Traits	Mean	Minimum	Maximum	PCV (%)	GCV (%)	h^2(%)	GAM (%)
1	No of eggs laid on 50 seeds	151.4	42	236	30.5	18.5	36.7	23.0
2	Number of adults emerged in 40 days	33.6	4	48	38.6	36.3	88.7	70.4
3	Number of adults emerged in 50 days	42.1	9	50	21.4	18.5	74.9	33.0
4	Number of adults emerged in 60 days	43.4	13	51	18.8	15.5	67.9	26.3
5	Number of adults emerged in 70 days	44.6	18	53	17.4	14.1	65.7	23.6
6	Number of adults emerged in 105 days	45.1	19	53	16.6	12.9	59.8	20.5
7	Seed damage (%)	75.2	40	89	17.1	14.3	70.4	24.8
8	Seed weight loss (%)	40.5	28	44	10.6	8.1	58.2	12.7